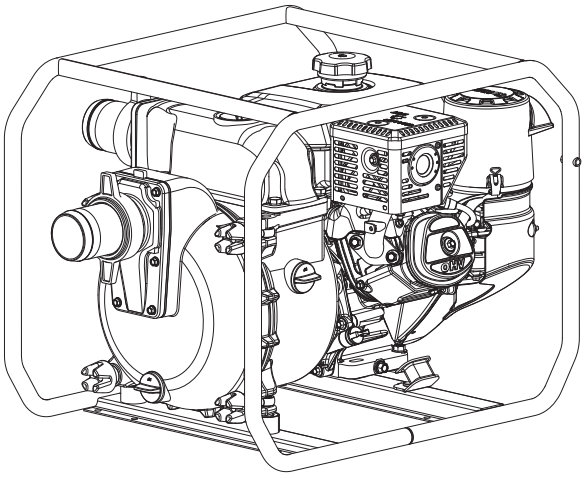
KOHLER®

TP 3.0, WP 2.0, WP 3.0

Trash Pump & Water Pump Service Manual



IMPORTANT: Read all safety precautions and instructions carefully before operating equipment. Refer to operating instruction of equipment that this engine powers.

Ensure engine is stopped and level before performing any maintenance or service.

For all engine related maintenance, disassembly and reassembly, refer to service manual of engine powering this equipment.

2 Safety
3 Specifications
5 Troubleshooting
6 Disassembly/Inspection and Service
10 Reassembly

Safety

SAFETY PRECAUTIONS

⚠ **WARNING:** A hazard that could result in death, serious injury, or substantial property damage.

⚠ **CAUTION:** A hazard that could result in minor personal injury or property damage.

NOTE: is used to notify people of important installation, operation, or maintenance information.

⚠ WARNING

Explosive Fuel can cause fires and severe burns.

Do not fill fuel tank while engine is hot or running.

Gasoline is extremely flammable and its vapors can explode if ignited. Never refuel while smoking or in vicinity of an open flame. Store gasoline only in approved containers, in well ventilated, unoccupied buildings, away from sparks or flames. Spilled fuel could ignite if it comes in contact with hot parts or sparks from ignition. Never use gasoline as a cleaning agent.

⚠ WARNING

Rotating Parts can cause severe injury.

Stay away while pump is in operation.

Keep hands, feet, hair, and clothing away from all moving parts to prevent injury. Never operate pump with covers, shrouds, or guards removed.

⚠ CAUTION

Electrical Shock can cause injury.

Do not touch wires while engine is running.

Never operate pump in rain or snow.

Never touch pump with wet hands or electrical shock will occur.

⚠ WARNING

Hot Parts can cause severe burns.

Do not touch engine while operating or just after stopping.

Never operate pump with heat shields or guards removed. Do not modify pump.

Place pump in a place where pedestrians or children are not likely to touch pump.

Be sure to carry pump only by its carrying handles.

⚠ WARNING

Carbon Monoxide. Can cause severe nausea, fainting or death.

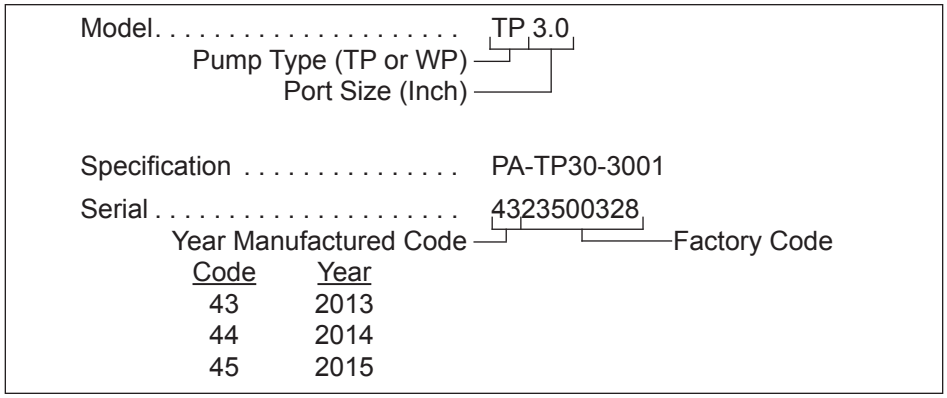
Avoid inhaling exhaust fumes. Only use product outdoors.

Engine exhaust gases contain poisonous carbon monoxide.

Carbon monoxide is odorless, colorless, and can cause death if inhaled.

ENGINE IDENTIFICATION NUMBERS

Kohler portable power products identification numbers (model, specification and serial) should be referenced for efficient repair, ordering correct parts, and product replacement.



GENERAL SPECIFICATIONS[3]	TP 3.0	WP 2.0	WP 3.0
Overall Dimensions (L x W x H)	685 mm (28.2 in.) 570 mm (22.4 in.) 540 mm (23.2 in.)	615 mm (24.3 in.) 476 mm (18.8 in.) 487 mm (19.2 in.)	
Suction and Discharge Size	76 mm (3 in.)	51 mm (2 in.)	76 mm (3 in.)
Dry Weight	43.1 kg (95.0 lbs.)	29.9 kg (66.0 lbs.)	34.9 kg (77.0 lbs.)
Maximum Flow Rate	1,200 l/min. (317 gal./min.)	602 l/min. (159 gal./min.)	1,003 l/min. (265 gal./min.)
Maximum Suction Head	8 m (26 ft.)		
Maximum Lift Head	26 m (85 ft.)		30 m (98 ft.)
Maximum Debris Size	28 mm (1.1 in.)	N/A	

TORQUE SPECIFICATIONS[3]

Engine Isolators

M8 Nut	18.3 N·m (162 in. lb.)

Frame/Engine Mounting

M8 Nut	25.5 N·m (226 in. lb.)

Pump Casing Assembly

M8 Screw	18.5 N·m (164 in. lb.)
M10 Screw	22.5 N·m (199 in. lb.)

Pump Casing Assembly

5/16-24 Screw	22.0 N·m (195 in. lb.)

[3] Values are in Metric units. Values in parentheses are English equivalents.

Specifications

GENERAL TORQUE VALUES

English Fastener Torque Recommendations for Standard Applications				
	Bolts, Screws, Nuts and Fasteners Assembled Into Cast Iron or Steel			Grade 2 or 5 Fasteners Into Aluminum
Size	Grade 2	Grade 5	Grade 8	
Tightening Torque: N·m (in. lb.) ± 20%				
8-32	2.3 (20)	2.8 (25)	—	2.3 (20)
10-24	3.6 (32)	4.5 (40)	—	3.6 (32)
10-32	3.6 (32)	4.5 (40)	—	—
1/4-20	7.9 (70)	13.0 (115)	18.7 (165)	7.9 (70)
1/4-28	9.6 (85)	15.8 (140)	22.6 (200)	—
5/16-18	17.0 (150)	28.3 (250)	39.6 (350)	17.0 (150)
5/16-24	18.7 (165)	30.5 (270)	—	—
3/8-16	29.4 (260)	—	—	—
3/8-24	33.9 (300)	—	—	—
Tightening Torque: N·m (ft. lb.) ± 20%				
5/16-24	—	—	40.7 (30)	—
3/8-16	—	47.5 (35)	67.8 (50)	—
3/8-24	—	54.2 (40)	81.4 (60)	—
7/16-14	47.5 (35)	74.6 (55)	108.5 (80)	—
7/16-20	61.0 (45)	101.7 (75)	142.5 (105)	—
1/2-13	67.8 (50)	108.5 (80)	155.9 (115)	—
1/2-20	94.9 (70)	142.4 (105)	223.7 (165)	—
9/16-12	101.7 (75)	169.5 (125)	237.3 (175)	—
9/16-18	135.6 (100)	223.7 (165)	311.9 (230)	—
5/8-11	149.5 (110)	244.1 (180)	352.6 (260)	—
5/8-18	189.8 (140)	311.9 (230)	447.5 (330)	—
3/4-10	199.3 (147)	332.2 (245)	474.6 (350)	—
3/4-16	271.2 (200)	440.7 (325)	637.3 (470)	—

Metric Fastener Torque Recommendations for Standard Applications						
	Property Class					Noncritical Fasteners Into Aluminum
Size	4.8	5.8	8.8	10.9	12.9	
Tightening Torque: N·m (in. lb.) ± 10%						
M4	1.2 (11)	1.7 (15)	2.9 (26)	4.1 (36)	5.0 (44)	2.0 (18)
M5	2.5 (22)	3.2 (28)	5.8 (51)	8.1 (72)	9.7 (86)	4.0 (35)
M6	4.3 (38)	5.7 (50)	9.9 (88)	14.0 (124)	16.5 (146)	6.8 (60)
M8	10.5 (93)	13.6 (120)	24.4 (216)	33.9 (300)	40.7 (360)	17.0 (150)
Tightening Torque: N·m (ft. lb.) ± 10%						
M10	21.7 (16)	27.1 (20)	47.5 (35)	66.4 (49)	81.4 (60)	33.9 (25)
M12	36.6 (27)	47.5 (35)	82.7 (61)	116.6 (86)	139.7 (103)	61.0 (45)
M14	58.3 (43)	76.4 (56)	131.5 (97)	184.4 (136)	219.7 (162)	94.9 (70)

Torque Conversions	
N·m = in. lb. x 0.113	in. lb. = N·m x 8.85
N·m = ft. lb. x 1.356	ft. lb. = N·m x 0.737

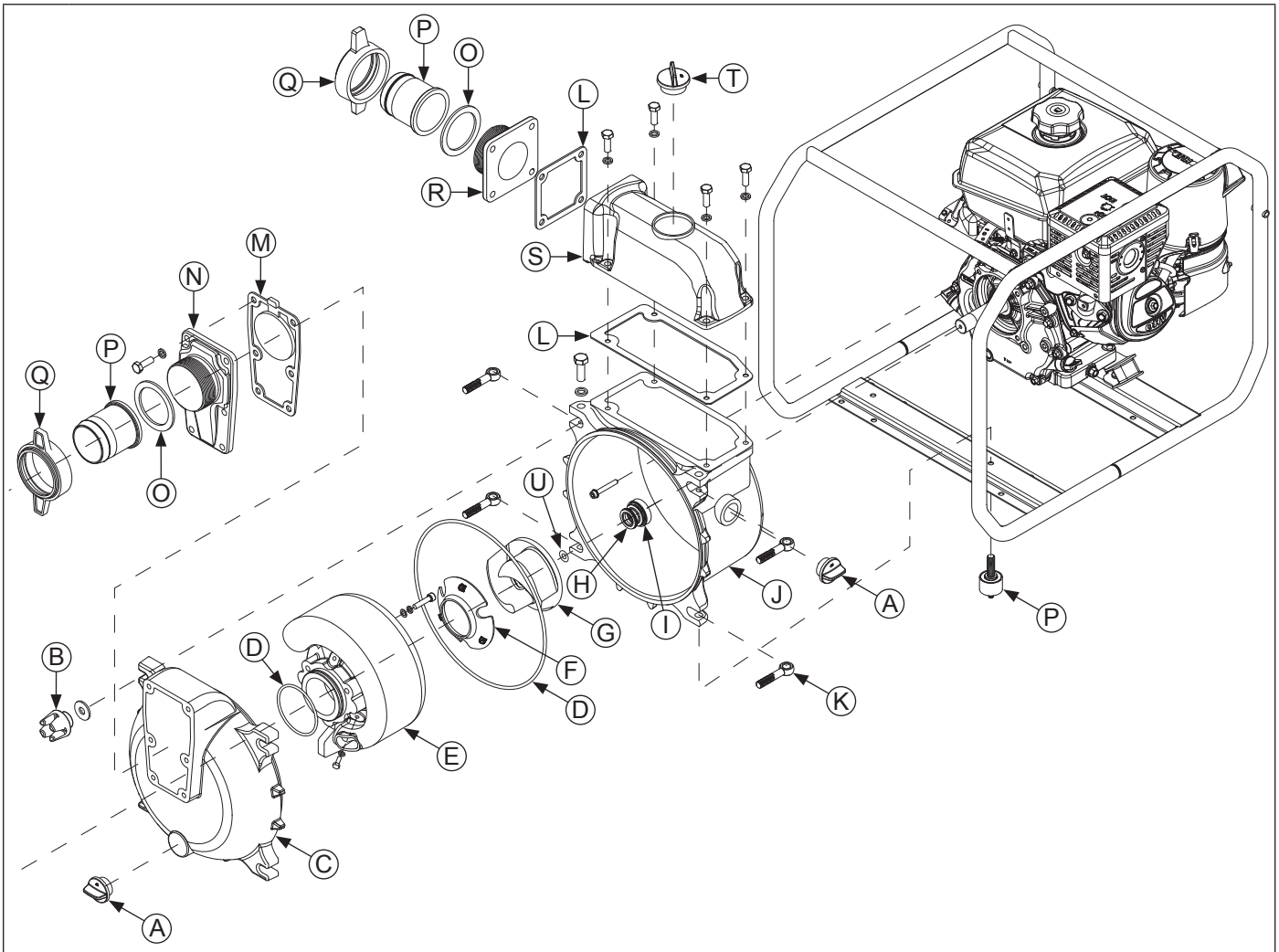
TROUBLESHOOTING GUIDE

When troubles occur, be sure to check simple causes which, at first, may seem too obvious to be considered. For example, a starting problem could be caused by an empty fuel tank.

Some general common causes of pump troubles are listed below. Use these to locate causing factors.

Condition	Possible Cause	Conclusion
Pump fails to prime.	Pump not filled with liquid.	Add liquid to pump through priming port.
	Air leak at suction line connection.	Add sealant to connection.
	Worn suction connection gasket.	Replace suction gasket.
	Leaking suction line.	Inspect, repair, or replace suction line.
	Engine speed too low.	Run engine at maximum speed.
	Worn or broken volute or impeller.	Replace parts as required.
	Leaking/worn mechanical seal.	Replace mechanical seal.
	Clogged suction strainer/line.	Clean strainer and suction line.
	Suction lift too great (25 ft. max).	Reduce lift.
	Suction line too long.	Reduce length to under 30 feet.
	Pump is air locked.	Vent pump discharge through priming port.
Pump primes too slowly.	Insufficient priming water.	Add more water through pump filler cap.
	Mechanical seal chipped or broken.	Replace mechanical seal.
	Check valve damaged.	Replace check valve.
	Suction hose damaged or strainer clogged.	Replace hose.
	Air leaks caused by O-ring damage.	Clean strainer.
	Engine rpm too low.	Replace O-rings.
	Lift head too high.	Check rpm and reset throttle as required.
	Insufficient priming water.	Lower lift head.
Reduced capacity or discharge pressure.	Clogged strainer or lines.	Clean strainer, suction and discharge lines.
	High friction loss in line.	Remove kinks and elbows, reduce length.
	Discharge head too high.	Lower end of discharge line, remove nozzles.
	Engine speed too low.	Increase engine speed.
	Drop in engine output.	Repair engine.
	Clogged impeller.	Remove clog.
	Worn/damaged impeller or volute.	Replace parts as required.
Pump will not work/engine will not turn over.	Clogged pump.	Remove clog between impeller and volute.
	Pump parts rusted together.	Disassemble pump, free parts.
	Damaged impeller or volute.	Replace volute or impeller.
	Engine seized.	Remove pump from engine, check engine itself.
Pump will not work/engine runs.	Impeller stripped/key sheared.	Disassemble pump, replace parts/engine.
	Pump impeller/volute clogged.	Clean pump.
	Insufficient liquid supply.	Increase liquid supply.

TP 3.0 Components



A	Pump Drain Plug	**B**	Knob Nut	**C**	Pump Cover	**D**	O-ring
E	Volute	**F**	Impeller Cover	**G**	Impeller	**H**	Rotating Seal
I	Mechanical Seal	**J**	Pump Case	**K**	Eye Bolt	**L**	Gasket
M	Check Valve	**N**	Inlet Flange	**O**	Rubber Seal	**P**	Hose Joint
Q	Coupling	**R**	Outlet Flange	**S**	Discharge Chamber	**T**	Pump Filler Cap
U	Shims						

Remove Outlet Flange

NOTE: Outlet flange position is important. Observe which way outlet flange faces discharge chamber for reassembly.

1. Remove outlet flange screws and remove outlet flange.

Inspection
Inspect gasket for cracks, tears or improper fit. Replace if necessary.

Remove Discharge Chamber

1. Remove discharge chamber screws and lift discharge chamber off.
2. Remove gasket.

Inspection
Inspect gasket for tears, cracks, or twists. Replace if necessary.

Remove Inlet Flange and Check Valve

NOTE: Check valve position is important. Observe which way check valve faces inlet flange for reassembly.

1. Remove inlet flange screws and remove inlet flange.

Inspection
Inspect check valve for tears, cracks, or twists. Replace if necessary.

Remove Pump Cover and Volute

NOTE: Pump cover and volute are heavy; be prepared to handle weight to maneuver for inspection and service.

1. Drain any water from reservoir by loosening drain plug. Loosen knob nuts that hold pump cover to pump case. Use special wrench provided with pump.
2. Push knobs to side and remove pump cover from pump case.

Inspection
Inspect volute, impeller cover and pump cover for cracks or bent castings. Also inspect impeller cover for uneven wear marks.

NOTE: Volute position is important. Observe which way volute discharge faces pump cover for reassembly.

1. Remove Allen head screws holding volute to pump cover.
2. Tap with a rubber mallet to free volute from pump cover.
3. Carefully remove volute from housing by pulling up.
4. Check volute O-ring sealing volute to pump cover. Check for nicks, cracks, and tearing. Replace if necessary.
5. Remove screws that hold impeller cover to volute. Remove impeller cover.
6. Check condition of pump cover O-ring. Check for nicks, tears and gouging.
7. Install impeller cover with screws and washers.
8. Apply Loctite® 587™ Ultra Blue or equivalent to impeller cover screws before tightening.
9. Torque impeller cover screws to 18.5 N·m (164 in. lbs.).
10. Position volute back onto pump cover with screws and washers.
11. Apply Loctite® 587™ Ultra Blue or equivalent to screws before installing.
12. Torque screws to 18.5 N·m (164 in. lbs.).
13. Volute and pump cover are now ready to be installed onto pump case.

Remove Impeller

NOTE: Impeller is heavy.

1. Remove pump drain plug on pump case for access to impeller. Insert a soft rod, such as aluminum or brass, through pump drain plug hole and position rod against impeller. Using a hammer, hit rod to loosen impeller.
2. Turn impeller counter-clockwise by hand until free from crankshaft. Be prepared to catch impeller when free from crankshaft.
3. Inspect impeller for cracks and bent blades.
4. Count number of shim(s) that are located on end of crankshaft. Remove slowly and make sure to replace with same number when reassembling.
5. Shim(s) may get stuck in impeller. Use a screwdriver to pry out and inspect. Shim should not be bent or distorted in any way. Replace if necessary.
6. Turn impeller over and remove rotating seal with a small screwdriver. Pry on bottom side and lift upward until removed from impeller.
7. There is a wrong side to rotating seal. Colored marks will face inward (or towards inlet nozzle side of pump).

Inspection

Inspect condition of volute to pump case O-ring. Check for cracks, nicks or tears. Replace if necessary.

Remove Mechanical Seal

NOTE: Drops of dish washing soap on shaft will help remove mechanical seal. This prevents sealing lip from possibly tearing when removing.

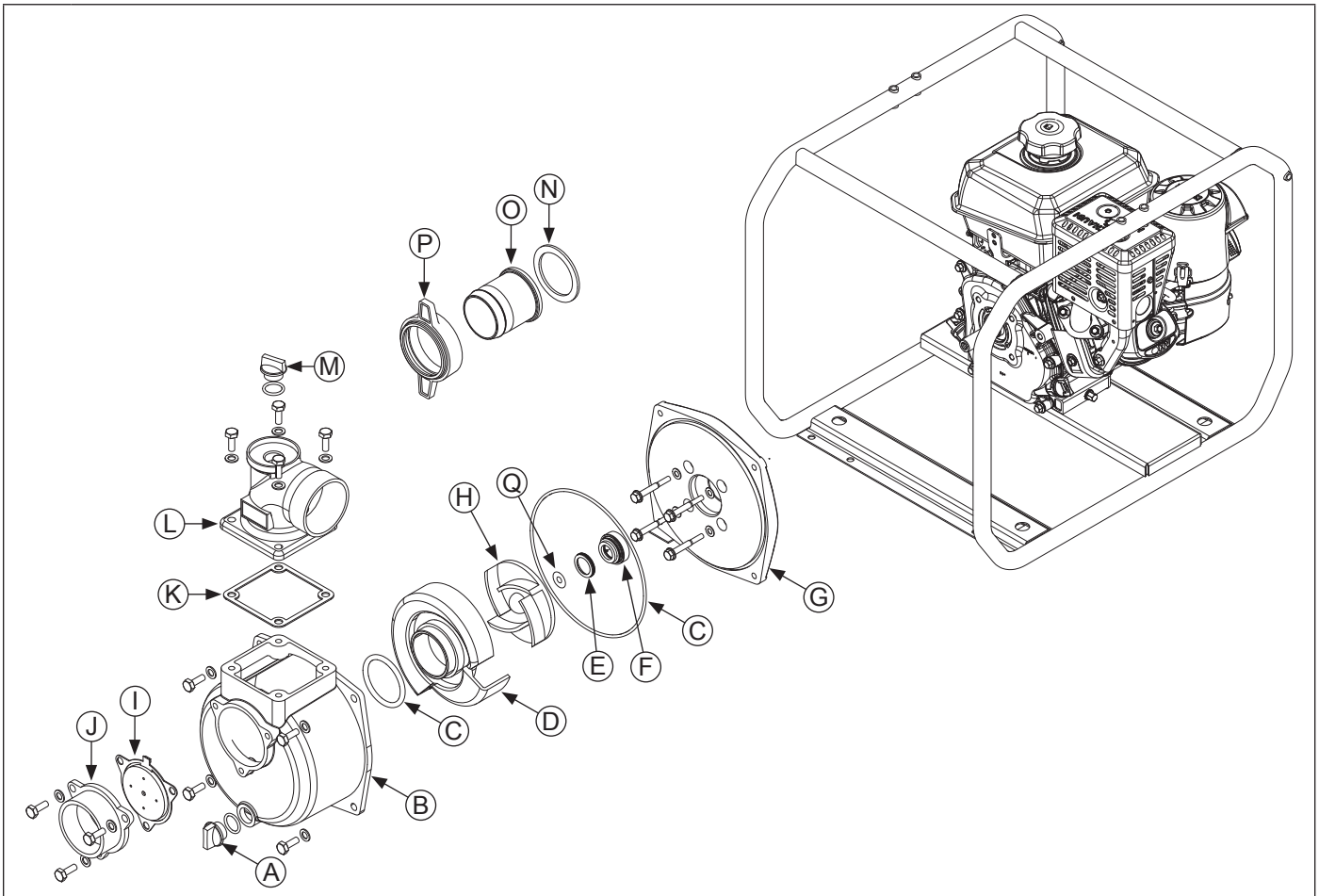
NOTE: If pump case needs to be removed to remove mechanical seal, follow Remove Pump Case directions then remove mechanical seal.

1. Using two screwdrivers, remove mechanical seal by prying side to side until it is free. It may be necessary to remove pump case to remove mechanical seal.
2. Pull seal off crankshaft and inspect for cracks, burn marks and overall condition. Replace if necessary.

Remove Pump Case

1. Remove screws securing pump case to engine. These are special screws with special washers. Make sure to replace with same part numbers if needed.
2. Loosen screws that hold pump case to frame and prepare to tilt engine back slightly for removal of pump case.
3. Lift engine and pump case high enough to clear screws from frame mounts.
4. Pull pump case from engine. It may become necessary to tap of pump case slightly with a rubber mallet.
5. Should it become necessary to remove engine for service, then remove screws that hold it to engine vibration mounts.

WP 2.0/WP 3.0 Components



A	Pump Drain Plug	**B**	Pump Cover	**C**	O-ring	**D**	Volute
E	Rotating Seal	**F**	Mechanical Seal	**G**	Pump Case	**H**	Impeller
I	Check Valve	**J**	Inlet Flange	**K**	Gasket	**L**	Outlet Flange
M	Pump Filler Cap	**N**	Rubber Seal	**O**	Hose Joint	**P**	Coupling
Q	Shims						

Remove Outlet Flange

NOTE: Outlet flange position is important. Observe which way outlet flange faces discharge chamber for reassembly.

1. Remove outlet flange screws and remove outlet flange.

Inspection
Inspect gasket for cracks, tears or improper fit. Replace if necessary.

Remove Inlet Flange and Check Valve

NOTE: Check valve position is important. Observe which way check valve faces inlet flange for reassembly.

1. Remove inlet flange screws and remove inlet flange.

Inspection
Inspect check valve for tears, cracks, or twists. Replace if necessary.

Remove Pump Cover and Volute

NOTE: Pump cover and volute are heavy; be prepared to handle weight to maneuver for inspection and service.

NOTE: Volute is not secured to pump cover. Take care when handling pump cover and volute.

1. Drain any water from reservoir by loosening drain plug. Loosen screws that hold pump cover to pump case.

Inspection

Inspect volute and pump cover for cracks or bent castings.

NOTE: Volute position is important. Observe tab on volute matches notch in pump cover for reassembly.

1. Carefully remove volute from housing by pulling up.
2. Check volute O-ring sealing volute to pump cover. Check for nicks, cracks, and tearing. Replace if necessary.

Remove Impeller

NOTE: Impeller is heavy.

1. Using a rubber mallet, hit a blade to loosen impeller.
2. Turn impeller counter-clockwise by hand until free from crankshaft. Be prepared to catch impeller when free from crankshaft.
3. Inspect impeller for cracks and bent blades.
4. Count number of shim(s) that are located on crankshaft. Remove slowly and make sure to replace with same number when reassembling.
5. Shim(s) may get stuck in impeller. Use a screwdriver to pry out and inspect. Shim should not be bent or distorted in any way. Replace if necessary.
6. Turn impeller over and remove rotating seal with a small screwdriver. Pry on bottom side and lift upward until removed from impeller.
7. There is a wrong side to rotating seal. Colored marks will face inward (or towards inlet nozzle side of pump).

Inspection

Inspect condition of volute to pump case O-ring. Check for cracks, nicks or tears. Replace if necessary.

Remove Mechanical Seal

NOTE: Drops of dish washing soap on shaft will help remove mechanical seal. This prevents sealing lip from possibly tearing when removing.

NOTE: If pump case needs to be removed to remove mechanical seal, follow Remove Pump Case directions then remove mechanical seal.

1. Using two screwdrivers, remove mechanical seal by prying side to side until it is free. It may be necessary to remove pump case to remove mechanical seal.
2. Pull seal off crankshaft and inspect for cracks, burn marks and overall condition. Replace if necessary.

Remove Pump Case

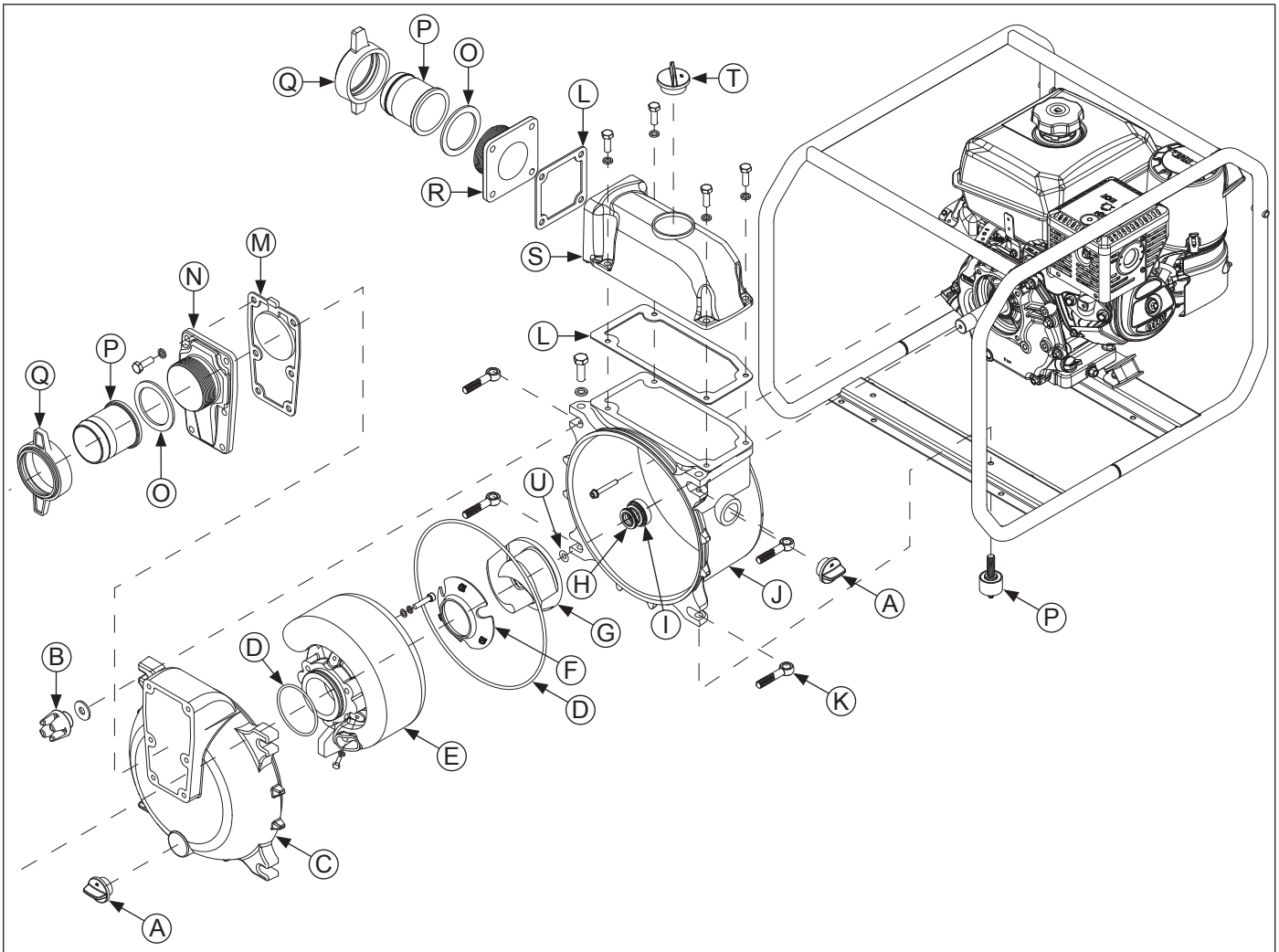
1. Remove screws securing pump case to engine. These are special screws with special washers. Make sure to replace with same part numbers if needed.
2. Loosen screws that hold pump case to frame and prepare to tilt engine back slightly for removal of pump case.
3. Lift engine and pump case high enough to clear screws from frame mounts.
4. Pull pump case from engine. It may become necessary to tap of pump case slightly with a rubber mallet.
5. Should it become necessary to remove engine for service, then remove screws that hold it to engine vibration mounts.

Inspection

Check condition of pump cover O-ring. Check for nicks, tears and gouging.

Reassembly

TP 3.0 Components



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E	Volute	**F**	Impeller Cover	**G**	Impeller	**H**	Rotating Seal
I	Mechanical Seal	**J**	Pump Case	**K**	Eye Bolt	**L**	Gasket
M	Check Valve	**N**	Inlet Flange	**O**	Rubber Seal	**P**	Hose Joint
Q	Coupling	**R**	Outlet Flange	**S**	Discharge Chamber	**T**	Pump Filler Cap
U	Shims						

Install Pump Case

NOTE: When replacing pump case on engine, note weep hole on backside of pump case. Weep hole must not be blocked with dirt or other obstruction. This weep hole prevents water from entering engine should mechanical seal fail while pumping water.

1. Apply Loctite® 587™ Ultra Blue or equivalent to screws.
2. Replace pump case and hold in position.
3. Secure with screws and washers.
4. Torque pump case screws to 22.5 N·m (199 in. lbs.).

Install Mechanical Seal

NOTE: Drops of dish washing soap on shaft will help install mechanical seal.

NOTE: If pump case was removed it will be easier to install mechanical seal before mounting pump case to engine.

1. Using thumbs, push mechanical seal into place.

Install Impeller

NOTE: Before placing rotating seal into impeller it will help to put some liquid detergent on seal. This will ease installation.

1. Replace shim(s). As noted earlier it will be necessary to replace with same amount that was taken off.
2. Install rotating seal into backside of impeller making sure rotating seal is not kinked and placed on straight.
3. Turn impeller on by hand in a clockwise position until tight.
4. Hit 1 blade in a clockwise position to tighten impeller until resistance is observed.

Install Pump Cover

1. Install pump cover to pump case and loosely tighten knob nuts making sure O-ring is seated correctly.
2. Tighten knob nuts with special tool that is provided with pump. Tighten very snugly.

Install Inlet Flange and Check Valve

1. Apply Loctite® 587™ Ultra Blue or equivalent to inlet flange screws.
2. Install inlet flange and check valve to pump cover with screws and washers. Torque screws to 18.5 N·m (164 in. lbs.).

Install Discharge Chamber

1. Install discharge chamber and gasket with screws and washers. Torque screws to 18.5 N·m (164 in. lbs.).

Install Outlet Flange

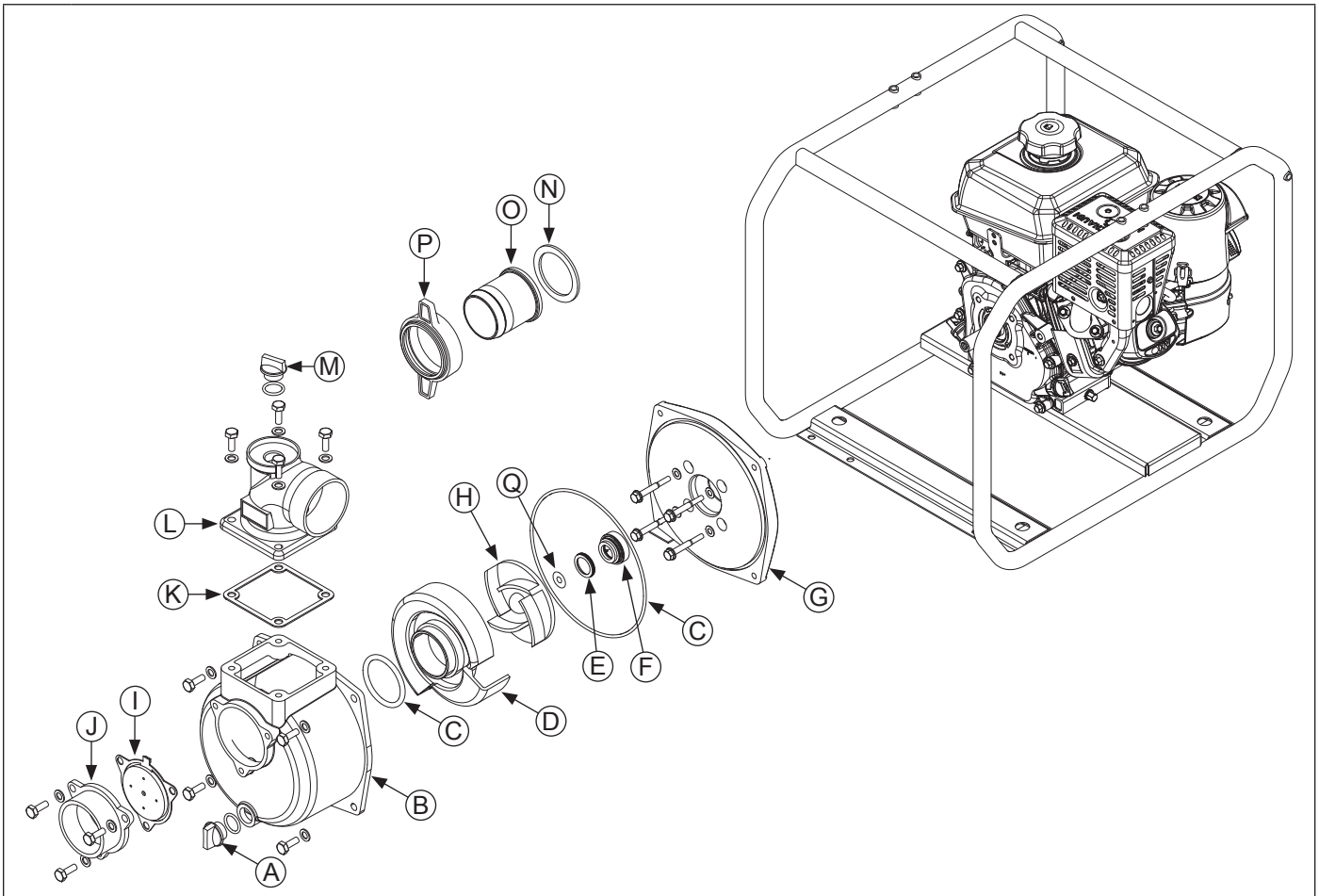
1. Apply Loctite® 5770™ High Temperature Thread Sealant or equivalent to screws
2. Install outlet flange and rubber gasket with screws and washers.
3. Torque screws to 18.5 N·m (164 in. lbs.).

Testing Pump

1. Before running check oil and pull engine over with retractable starter to make sure nothing is binding in pump.
2. Fill with prime water, start engine. After warm up run engine at full throttle and check vacuum with vacuum tester to make sure no leaks have developed. A vacuum of 20 to 25 lbs at sea level should be read. This reading should be obtained within 5 seconds.

Reassembly

WP 2.0/WP 3.0 Components



A	Pump Drain Plug	**B**	Pump Cover	**C**	O-ring	**D**	Volute
E	Rotating Seal	**F**	Mechanical Seal	**G**	Pump Case	**H**	Impeller
I	Check Valve	**J**	Inlet Flange	**K**	Gasket	**L**	Outlet Flange
M	Pump Filler Cap	**N**	Rubber Seal	**O**	Hose Joint	**P**	Coupling
Q	Shims						

Install Pump Case

NOTE: When replacing pump case on engine, note weep hole on backside of pump case. Weep hole must not be blocked with dirt or other obstruction. This weep hole prevents water from entering engine should mechanical seal fail while pumping water.

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3. Secure with screws and washers.
4. Torque pump case screws to 22.5 N·m (199 in. lbs.).

Install Mechanical Seal

NOTE: Drops of liquid detergent on shaft will help install mechanical seal.

NOTE: If pump case was removed it will be easier to install mechanical seal before mounting pump case to engine.

1. Using thumbs, push mechanical seal into place.

Install Impeller

NOTE: Before placing rotating seal into impeller it will help to put some liquid detergent on seal. This will ease installation.

1. Replace shim(s). As noted earlier it will be necessary to replace with same amount that was taken off.
2. Install rotating seal into backside of impeller making sure rotating seal is not kinked and placed on straight.
3. Turn impeller on by hand in a clockwise position until tight.
4. Hit 1 blade in a clockwise position to tighten impeller until resistance is observed.
5. Place volute against pump case and check clearance between volute and impeller with a feeler gauge. A clearance larger than 1.2 mm (0.0472) requires another shim. A clearance of less than 0.4 mm (0.0157 in.) requires removal of a shim. If a shim is added or removed, repeat steps 3, 4 and 5.
6. Remove volute.

Install Pump Cover

1. Install volute into pump cover, aligning volute tab and pump case notch.
1. Install pump cover to pump case and loosely tighten screws making sure O-ring is seated correctly.
2. Torque pump cover screws to 18.5 N·m (164 in. lbs.).

Install Inlet Flange and Check Valve

1. Apply Loctite® 587™ Ultra Blue or equivalent to inlet flange screws.
2. Install inlet flange and check valve to pump cover with screws and washers. Torque screws to 18.5 N·m (164 in. lbs.).

Install Outlet Flange

1. Apply Loctite® 5770™ High Temperature Thread Sealant or equivalent to screws
2. Install outlet flange and rubber gasket with screws and washers.
3. Torque screws to 18.5 N·m (164 in. lbs.).

Testing Pump

1. Before running check oil and pull engine over with retractable starter to make sure nothing is binding in pump.
2. Fill with prime water, start engine. After warm up run engine at full throttle and check vacuum with vacuum tester to make sure no leaks have developed. A vacuum of 20 to 25 lbs at sea level should be read. This reading should be obtained within 5 seconds.

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